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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/621,577	07/18/2003	Osamu Hoshuyama	Q76590	2125

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EXAMINER	
HAROLD, JEFFEREY F	

ART UNIT	PAPER NUMBER
2614	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/621,577	HOSHUYAMA, OSAMU	
	Examiner	Art Unit	
	Jefferey F. Harold	2614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-66* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8,13,14,22,30-34,42,43,51,52,54,56-60,62,64 and 66* is/are rejected.

7)☒ Claim(s) *7,9-12,15-21,23-29,35-41,44-50,53,55,61,63 and 65* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The references listed in the Information Disclosure Statement submitted on October 17, 2003 and May 4, 2005 have been considered by the examiner (see attached PTO-1449).

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 8, 13, 14, 22, 30-34, 42, 43, 51, 52, 54, 56-60, 62, 64 and 66 are rejected under 35 U.S.C. 102(e) as being anticipated by Diethorn (United States Patent 6,442,275).

Regarding claim 1, Diethorn discloses consolidated voice activity detection and noise estimation. In addition, Diethorn discloses a speech communication apparatus comprising: a signal output transducer for receiving a distant signal from a far-end talker and producing acoustic energy of the distant signal; a signal input transducer for producing a near-end signal which may contain a component representing a speech activity of a near-end talker or an acoustic echo component, or both, wherein said acoustic echo component occurs as a result of the distant signal being transmitted

through an acoustic echo path from the signal output transducer to the signal input transducer; an echo canceller for producing an echo replica from said distant signal and a residual echo; a residual echo detector for detecting a difference between said near-end signal and said echo replica and supplying the difference as said residual echo to said echo canceller; and a spectral shaper for receiving one of said near-end signal and said residual echo as a first input signal, receiving said echo replica as a second input signal, estimating from the first and second input signals said acoustic echo component when said speech activity is low or zero, and shaping spectrum of said first input signal with the estimated acoustic echo component, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 2, Diethorn discloses everything claimed as applied above (see claim 1), in addition Diethorn discloses wherein the spectral shaper estimates said acoustic echo component for each of a plurality of subband frequencies, of audio spectrum, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 3, Diethorn discloses everything claimed as applied above (see claim 1), in addition Diethorn discloses wherein the spectral shaper estimates said acoustic echo component from a ratio of said first input signal to the second input signal, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 4, Diethorn discloses everything claimed as applied above (see claim 1), in addition Diethorn discloses wherein said spectral shaper estimates said

acoustic echo component from a ratio of said first input signal to said second input signal for each of a plurality of subband frequencies of audio spectrum, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 5, Diethorn discloses everything claimed as applied above (see claim 1), in addition Diethorn discloses wherein said spectral shaper comprises: means for dividing said first input signal into a first set of subband frequency component signals; means for dividing said second input signal into a second set of subband frequency component signals; a plurality of subband spectral shaping means, each of the subband spectral shaping means receiving a corresponding one of the first set of subband frequency component signals as a first subband signal, receiving a corresponding one of the second set of subband frequency component signals as a second subband signal, producing an estimate of a subband acoustic echo component from the first and second subband signals, and shaping the first subband signal with the estimate of the subband acoustic echo component; and means for combining output signals of said plurality of subband spectral shaping means, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 6, Diethorn discloses everything claimed as applied above (see claim 5), in addition Diethorn discloses wherein each of said subband spectral shaping means comprises: a division circuit for producing a ratio of said first subband signal to said second subband; a smoother for smoothing said ratio when said speech activity is low or zero; a multiplier for multiplying said second subband signal by said smoothed ratio to produce said estimate of the subband acoustic echo component; and a

subtractor for producing a difference signal representative of the difference between the first subband signal and the estimate supplied from the multiplier, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 8, Diethorn discloses everything claimed as applied above (see claim 6), in addition Diethorn discloses wherein the division circuit includes first and second smothers for smoothing the first and second subband signals, respectively, before the ratio is produced, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 13, Diethorn discloses everything claimed as applied above (see claim 1), in addition Diethorn discloses a harmonic generator for emphasizing harmonics components of said distant signal contained in the echo replica from said echo canceller, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 14, Diethorn discloses everything claimed as applied above (see claim 1), in addition Diethorn discloses wherein said echo canceller comprises: means for dividing said residual echo into a first set of subband frequency component signals; means for dividing said distant signal into a second set of subband frequency component signals; an adaptive filter bank for adaptively filtering said second set of subband frequency component signals according to the first set of subband frequency component signals; means for combining output signals of said adaptive filter bank to produce said echo replica; and means for nullifying the first set of subband frequency component signals when said speech activity is high, wherein said spectral shaper

comprises: a plurality of subband spectral shaping means, each of the subband spectral shaping means receiving a corresponding one of the first set of subband frequency component signals as a first subband signal, receiving a corresponding one of the output signals of said adaptive filter bank as a second subband signals, producing an estimate of a subband acoustic echo component from the first and second subband signals, and shaping the first subband signal with the estimate of the subband acoustic echo component; and means for combing output signals of said plurality of subband spectral shaping means, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 22, Diethorn discloses a signal output transducer for receiving a distant signal from a far-end I talker and producing acoustic energy of the distant signal; means for dividing said distant signal into a first set of subband frequency component signals; a signal input transducer for producing a near-end signal which may contain a component representing a speech activity of a near-end talker or an acoustic echo component, or both, wherein said acoustic echo component occurs as a result of the distant signal being transmitted through an acoustic echo path from the signal output transducer to the signal input transducer; means for dividing said near-end signal into a second set of subband frequency component signals; a plurality of subband echo suppressors, each of the subband echo suppressors comprising: an echo canceller for producing an echo replica from a corresponding one of the first set of subband frequency component signals and a subband residual echo; a residual echo detector for detecting a difference between a corresponding one of the second set of subband

frequency component signals and said echo replica and supplying the difference as said residual echo to said echo canceller; and subband spectral shaping means for receiving said residual echo as a first subband input signal, receiving said echo replica as a second subband input signal, 6stimating from the first and second input signals said acoustic echo component when said speech activity is low or zero, and shaping the first subband input signal with the estimated acoustic echo component to produce an output signal of the subband echo suppressor, and means for combining the output signals of the plurality of subband echo suppressors, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 30, Diethorn discloses a method of suppressing acoustic echo, comprising the steps of: a) receiving a distant signal from a far-end talker and producing acoustic energy of the distant signal from a signal output transducer; b) producing a near-end signal from a signal input transducer which may contain a component representing a speech activity of a near-end talker or an acoustic echo component, or both, wherein said acoustic echo component occurs as a result of the distant signal being transmitted through an acoustic echo path from the signal output transducer to the signal input transducer; c) producing an echo replica from said distant signal and a l residual echo, detecting said residual echo between said near-end signal and said echo replica and using the residual echo as a feedback signal to produce said echo replica; and d) receiving one of said near-end signal and said residual echo as a first input signal, receiving said echo replica as a second input signal, and estimating from the first and second input signals said acoustic echo component when said speech activity is

low or zero; and e) shaping spectrum of said first input signal with the estimated acoustic echo component, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 31, Diethorn discloses everything claimed as applied above (see claim 30), in addition Diethorn discloses wherein step (d) estimates the acoustic echo component for each of a plurality of subband frequencies of audio spectrum, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 32, Diethorn discloses everything claimed as applied above (see claim 30), in addition Diethorn discloses wherein step (d) estimates the acoustic echo component from a ratio of the first input signal to the second input signal, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 33, Diethorn discloses everything claimed as applied above (see claim 30), in addition Diethorn discloses wherein step (d) estimates the acoustic echo component from a ratio of the first input signal to the second input signal for each of a plurality of subband frequencies of audio spectrum, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 34, Diethorn discloses everything claimed as applied above (see claim 30), in addition Diethorn discloses wherein step (d) comprises: d_1) dividing the first input signal into a first set of subband frequency component signals; d_2) dividing the second input signal into a second set of subband frequency component signals; d_3) receiving a corresponding one of the first set of subband frequency component signals as a first subband signal, receiving a corresponding one of the second set of subband

frequency component signals as a second subband signal, producing an estimate of a subband acoustic echo component from the first and second subband signals, and shaping the first subband signal with the estimate of the subband acoustic echo component; and d_4) combining output signals of said plurality of subband spectral shaping means as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 42, Diethorn discloses everything claimed as applied above (see claim 30), in addition Diethorn discloses accentuating harmonics components of the instant signal contained in the echo replica before estimating the acoustic echo component, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claim 43, Diethorn discloses everything claimed as applied above (see claim 30), in addition Diethorn discloses wherein step (c) comprises the steps of: dividing the residual echo into a first set of subband frequency component signals; dividing said distant signal into a second set of subband frequency component signals; adaptively filtering said second set of subband frequency component signals according to the first set of subband frequency component signals; combining the adaptively filtered signals to produce said echo replica; and nullifying the first set of subband frequency component signals when said speech activity is high, wherein step (d) comprises: receiving a corresponding one of the first set of subband frequency component signals as a first subband signal, receiving a corresponding one of the adaptively filtered signals as a second subband signal, and producing an estimate of a

subband acoustic echo component from the first and second subband signals; shaping the first subband signal with the estimate of the subband acoustic echo component; and combining a plurality of said shaped first subband signals, as disclosed at column 2, line 1 through column 5, line 50 and exhibited in figures 1 and 2.

Regarding claims 51, 52, 54, 56-60, 62, 64, and 66 they are interpreted and thus rejected based on the rejections cited above.

Allowable Subject Matter

Claims 7, 9-12, 15-21, 23-29, 35-41, 44-50, 53, 55, 61, 63, 65 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Citation of Pertinent Art

Marchok et al. (United States Patent 6,526,140), discloses consolidated voice activity detection and noise estimation.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jefferey F. Harold whose telephone number is (571)272-7519. The examiner can normally be reached on 8AM - 4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ahmad Matar can be reached on (571)2727488. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jefferey F Harold
Primary Examiner
Art Unit 2614

JFH
May 10, 2007